DOCUMENT RESUME

ED 359 140 SP 034 415

AUTHOR Turner, Jeannine

TITLE Focusing on Teachers: ESEA Title II Mathematics and Science Teacher Training 1991-92.

INSTITUTION Austin Independent School District, Tex. Office of Research and Evaluation.
REPORT NO AISD-91.26
PUB DATE Jul 92
NOTE 42p.; For an earlier report, see ED 325 520.
PUB TYPE Reports - Evaluative/Feasibility (142) -- Tests/Evaluation Instruments (160)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Academically Gifted; Elementary Secondary Education; Faculty Development; Federal Programs; *Inservice Teacher Education; Instructional Materials; Mathematics Instruction; *Mathematics Teachers; Needs Assessment; Program Evaluation; Science Instruction; *Science Teachers; *Teacher Improvement; Teaching Methods; Workshops
IDENTIFIERS *Austin Independent School District TX; *Elementary Secondary Education Act Title II

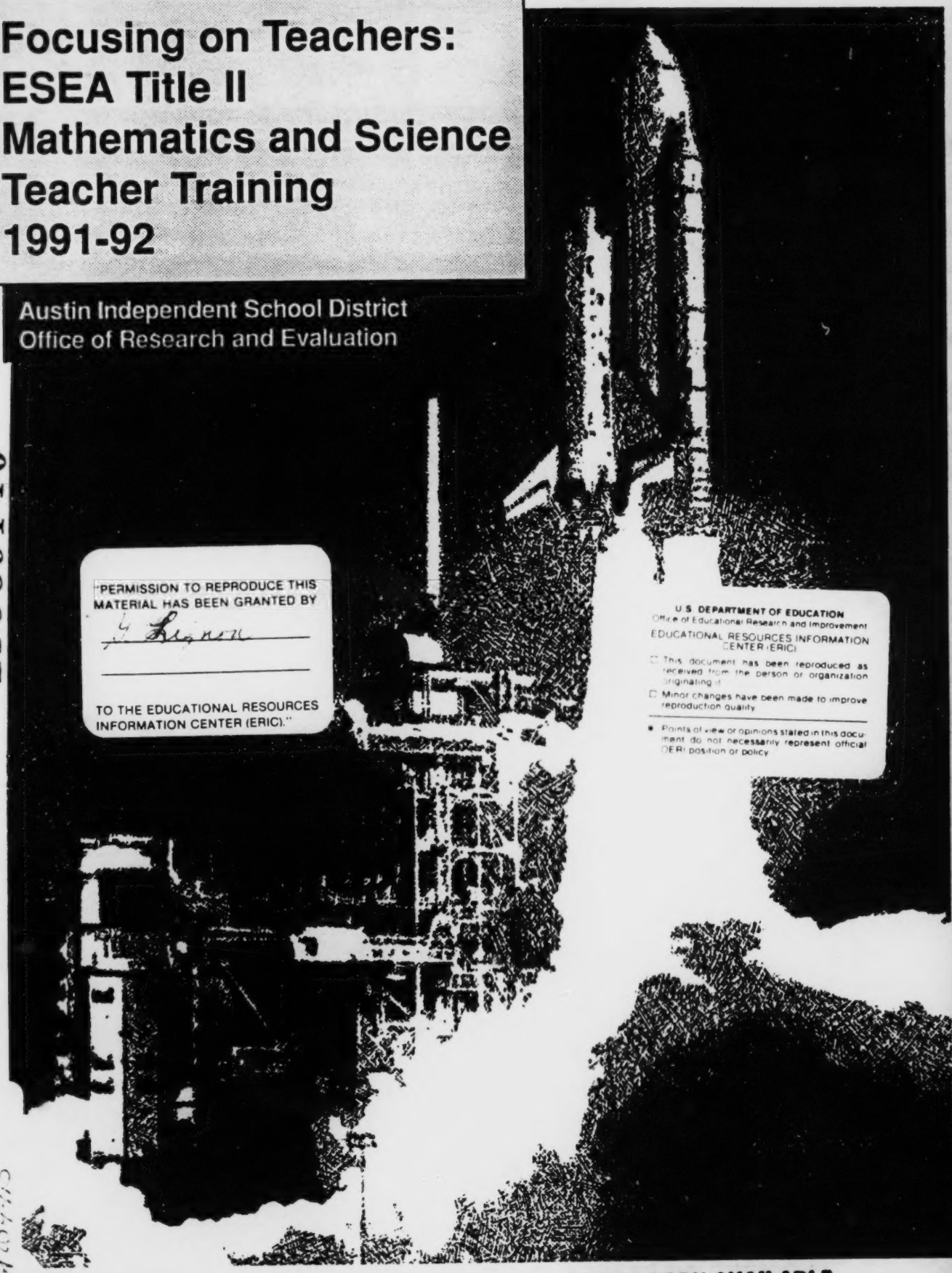
ABSTRACT

Title II of the Elementary and Secondary Education Act provides federal funds for the improvement of mathematics and science teaching at all levels of education (pre-K through 12). In 1991-92, funds were targeted by the Austin (Texas) Independent School District to serve 630 elementary and secondary teachers of mathematics and science. A project was conducted which provided a needs assessment, staff development workshops, funds for teachers to attend professional conferences, materials and/or equipment, funds for gifted and talented programs, and a 1991-1992 evaluation of previously funded Title II projects. The needs assessment determined that teachers of mathematics and science perceive their training as sufficient to teach basic skills but are interested in further training. Staff development workshops were rated positively by most participants; elementary and secondary teachers who participated in professional conferences believe that attendance will assist in making them better teachers, and classroom observations documented the use of materials and teaching techniques demonstrated at Title II workshops. Appendices provide a needs assessment questionnaire; evaluation results of elementary, secondary, and gifted mathematics and science workshops; and professional conference evaluations. (LL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

Focusing on Teachers: ESEA Title II Mathematics and Science Teacher Training 1991-92

Austin Independent School District
Office of Research and Evaluation



ED359140

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

BEST COPY AVAILABLE

Focusing on Teachers: ESEA Title II Mathematics and Science Teacher Training

Austin Independent School District
Department of Management Information
Office of Research and Evaluation

Executive Summary

Author: Jeannine Turner

Program Description

Title II of the Elementary and Secondary Education Act (ESEA) provides federal funds for the improvement of mathematics and science teaching at all levels of primary and secondary education (pre-K through 12). Title II was designed to serve all elementary and secondary mathematics and science teachers in the Austin Independent School District. In 1991-92, AISD received approximately $166,461 from Title II funds. The project provided:

- A needs assessment,
- Staff development workshops,
- Funds for teachers to attend professional meetings,
- New materials and equipment,
- Funds for gifted and talented programs to be developed and implemented, and
- The 1991-92 evaluation of Title II-funded projects.

Major Findings

1. In their own view, present teachers of mathematics and science have received sufficient training to teach basic skills in their respective areas. They are, however, interested in receiving additional training in both basic and advanced topics (p. 5).
2. Most teachers rated staff development workshops positively (p. 7).
3. Elementary and secondary teachers believe that conference attendance would assist in making them better teachers (p. 21).
4. Classroom observations revealed the use of Title II-funded materials and teaching techniques demonstrated at Title II-funded workshops (p. 24).

Budget Implications

Mandate:

External funding agent

Fund Amount:

$166,461

Funding Source:

Federal

Implications:

The objective of Title II training is to enrich mathematics and science instructional strategies and curricula in order to enhance student achievement. The program directly targets AISD's fifth strategic objective, which is part of an overall strategy for ongoing professional development. The program also supports the first strategic objective, which focuses on motivating student learning and achievement.

PROGRAM EFFECTIVENESS SUMMARY

MATHEMATICS AND SCIENCE TEACHER TRAINING
1991-92

EFFECT	COST	COMPONENT
+	$$	ELEMENTARY MATHEMATICS
+	$$	SECONDARY MATHEMATICS
+	$$	ELEMENTARY GIFTED
+	$$	ELEMENTARY SCIENCE
+	$$	SECONDARY SCIENCE

Effect is expressed as contributing to any of the five AISD strategic objectives.

- \+ *Positive*, needs to be maintained or expanded
- 0 *Not significant*, needs to be improved and modified
- \- *Negative*, needs major modification or replacement
- Blank *Unknown*

Cost is the expense over the regular District per-student expenditure.

- 0 *No cost* or minimal cost
- $ *Indirect costs* and over-head, but no separate budget
- $$ *Some direct costs*, but under $500 per student
- $$$ *Major direct costs* for teachers, staff, and/or equipment in the range of $500 per student or more

Note: Funds are expended to train teachers, but the intended impact is on students therefore, the number of potential students (which is theoretically all AISD students) have been used for cost calculations.

Effectiveness is based on evaluation of component activities.

TABLE OF CONTENTS

EXECUTIVE SUMMARY i

PROGRAM EFFECTIVENESS SUMMARY iii

CONCLUSION 1

INTRODUCTION 2

EVALUATION OVERVIEW 4

NEEDS ASSESSMENT 5

WORKSHOP EVALUATIONS 7

Elementary Mathematics 7

Gifted Elementary Mathematics 9

Secondary Mathematics 12

Elementary Science 15

Gifted Elementary Science 18

CONFERENCE EVALUATIONS 21

CLASSROOM OBSERVATIONS 25

Elementary Mathematics 25

Gifted Elementary Mathematics 26

Secondary Mathematics 27

REFERENCES 27

APPENDICES 28

CONCLUSION

Overall, it appears that Title II funds were used effectively to improve mathematics and science teaching. The spring 1992 needs assessment determined that present teachers of mathematics and science perceive that they have received sufficient training to teach basic skills in their areas, but they are interested in further training. Staff development workshops were rated positively by most participants, and it appears that the objectives of training teachers on current technology, teaching techniques, and activities have been met. Elementary and secondary teachers who participated in professional conferences believe that attendance will assist in making them better teachers. Finally, classroom observations documented the use of materials and teaching techniques demonstrated at previously funded Title II workshops.

INTRODUCTION

Title II of the Elementary and Secondary Education Act (ESEA) targets the improvement of mathematics and science teaching at all levels of primary and secondary education (pre-K through 12). Federal Title II program funds are used to maintain current levels of mathematics and science instruction as well as to enrich curricula and teacher training. At the elementary level, Title II-funded projects focus on training in math and science concerning basic knowledge of concepts and processes, the use of updated materials, and teaching techniques that approach higher order thinking skills. At the secondary level, training is focused on modern technology and innovative instructional approaches to enhance higher order thinking skills. Title II-funded projects are intended ultimately to impact student interest, involvement, and learning in the areas of mathematics and science. The impact of teacher training on students, however, can only be ascertained over time and evaluated indirectly by student achievement, enrollment in advanced courses, and continuation in mathematics and science careers.

In the 1991-92 school year, Title II funds were targeted to serve 630 elementary and secondary teachers of mathematics and science. From July, 1991 through June, 1992, AISD requested $166,461 from Title II funds to provide:

- A needs assessment to determine if teachers of mathematics and science have received sufficient training to teach basic skills and to assess areas of interest in basic and advanced training,
- Staff development workshops to acquaint teachers with the latest developments in instructional techniques and materials in their field,
- Funds for teachers to attend professional conferences providing teacher involvement and continued learning within their profession,
- Materials and/or equipment to augment resources or to accompany training in new methods of instruction,
- Funds for gifted and talented programs to be developed and implemented, and
- The 1991-92 evaluation of Title II-funded projects.

Figure 1 shows the configuration of activities within the 1991-92 Title II components by subject area and level (elementary or secondary).

FIGURE 1
ELEMENTS OF TITLE II PARTICIPATION
1991-92

ESEA TITLE II COMPONENTS	Needs Assessment	Staff Development Workshops	Attendance at Conferences	Materials	Classroom Observations
Elementary Mathematics	X	X	X	X	X
Elementary Gifted Math.	X	X	X	X	X
Secondary Mathematics	X	X	X	X	X
Elementary Science	X	X	X	X	
Elementary Gifted Science	X	X		X	
Secondary Science	X	X	X	X	

EVALUATION OVERVIEW

Data for the evaluation of Title II-funded projects were obtained from the following sources.

- A needs assessment was conducted to determine if basic training needs in elementary and secondary mathematics and science had been met. Data were collected from a survey taken in spring 1992.

- Workshop questionnaires garnered teacher opinions for the evaluation of workshops offered to teachers of elementary, gifted elementary, and secondary mathematics. Questionnaires were distributed at the close of workshops.

- Conference questionnaires were the source of information for the evaluation of conferences attended by selected teachers of elementary and secondary mathematics and science. Because professional meetings are most often held out of the Austin area, questionnaires were distributed upon the return of participants.

- Interviews with AISD instructional coordinators and financial records were the sources of information concerning the purchase and distribution of materials and equipment. New materials/equipment were demonstrated or distributed at workshops where teachers often engaged in hands-on training. Data concerning teacher opinion of the potential effectiveness of new materials were obtained from workshop questionnaires.

- Interviews with AISD instructional coordinators provided information on conference/workshop subjects, dates, locations, and teacher attendance.

- Classroom observations were performed to determine the implementation of previously funded Title II projects. Data were obtained via AISD instructional coordinators.

Most of the information presented in this report was acquired from self-report measures. The workshop and conference questionnaires focus on the experience of the participants and their opinions of the potential usefulness of the information obtained. The needs assessment survey was a self-report measurement of teachers' perception focusing on their initial and subsequent training. The classroom observations, however, were an attempt to go beyond self-report measures and to ascertain the actual use of Title II-funded training and materials from previous years.

NEEDS ASSESSMENT

In their own view, present teachers of mathematics and science have received sufficient training to teach basic skills in their respective areas. They are, however, interested in receiving additional training in both basic and advanced topics.

A needs assessment survey was taken in spring 1992 in order to determine if present teachers of mathematics and science believe they have received sufficient training to teach basic skills in their areas and to assess areas of interest in basic and advanced training. The needs assessment was a self-report survey and is therefore limited to teachers' opinion of their initial training.

In a random selection procedure, 25% of regular elementary teachers and 50% of secondary mathematics and science teachers were selected to receive the needs assessment questionnaire. Of the 332 questionnaires issued, 321 were returned (a response rate of 97%).

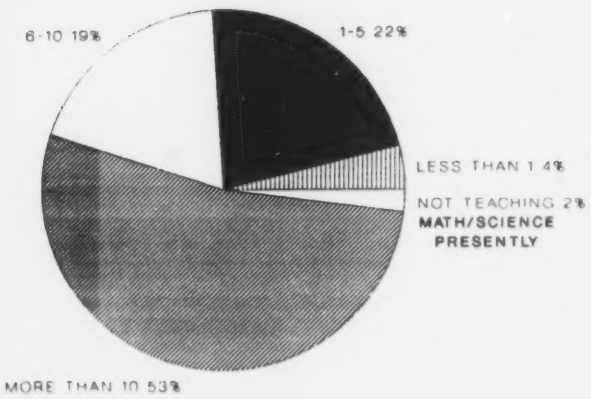
The needs assessment revealed the following information (see Figure 2 and also Appendix 1).

- Most of the District's science and mathematics teachers are veteran teachers who believe that they have received sufficient basic skills training to teach their subjects well.
- At the same time, almost all of these teachers have sought additional training beyond their initial training, and most would like to receive additional training in both basic and advanced skills areas, especially computers.
- Most of the teachers found the training offered by the District to be useful.

An argument could be made that the teachers' positive view of their training is at odds with the actual performance of students on mathematics and/or science standardized tests. However, student test performance is related to many factors besides teacher training, and no one-to-one relationship can be inferred. In addition, it is not surprising that teachers would report that they are competent to teach in their respective areas. Finally, a limitation of self-report data is that they are subjective and are not necessarily congruent with data from other sources.

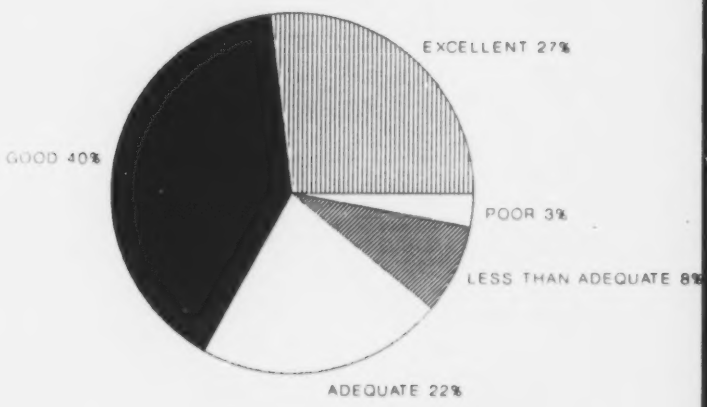
FIGURE 2
TITLE II NEEDS ASSESSMENT OF TEACHER TRAINING
1991-92

N = 308



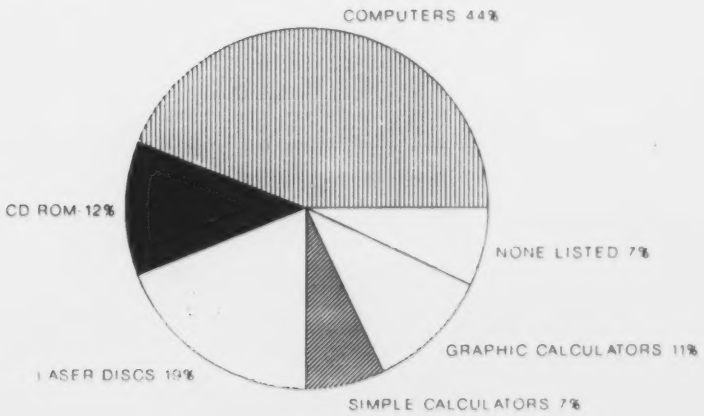
YEARS OF EXPERIENCE IN TEACHING
MATHEMATICS AND/OR SCIENCE

N = 306



RATING OF INITIAL PREPARATION
FOR TEACHING MATHEMATICS AND/OR SCIENCE

N = 470
(TEACHERS COULD CHOOSE MORE THAN ONE TOPIC)



ADVANCED TOPICS OF INTEREST
FOR FUTURE TRAINING

WORKSHOP EVALUATIONS

Staff development workshops assist in keeping teachers current on instructional models and teaching techniques in their field. They also introduce innovative materials and equipment with correspondingly fresh instructional techniques. Due to the turnover of mathematics and science teachers, there is a continuous need for training and retraining in the mathematics and science areas.

ELEMENTARY

Elementary Mathematics

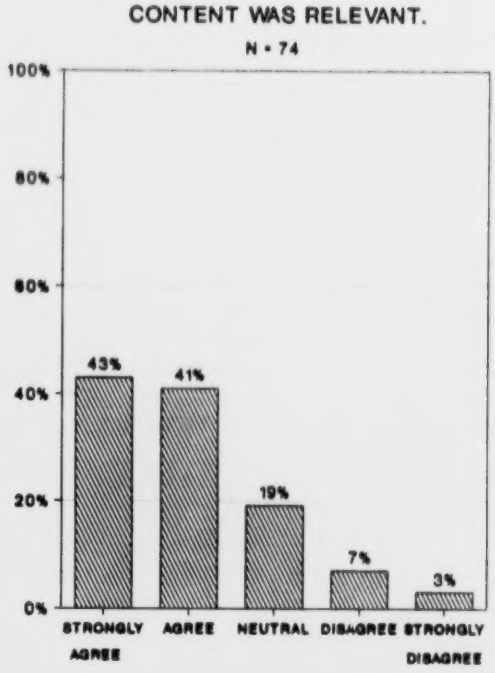
Most of the responses to the elementary mathematics workshop evaluations were positive. Participants of the "Teaching and Testing Strategies" workshop responded very positively and expressed their enthusiasm for the concepts presented.

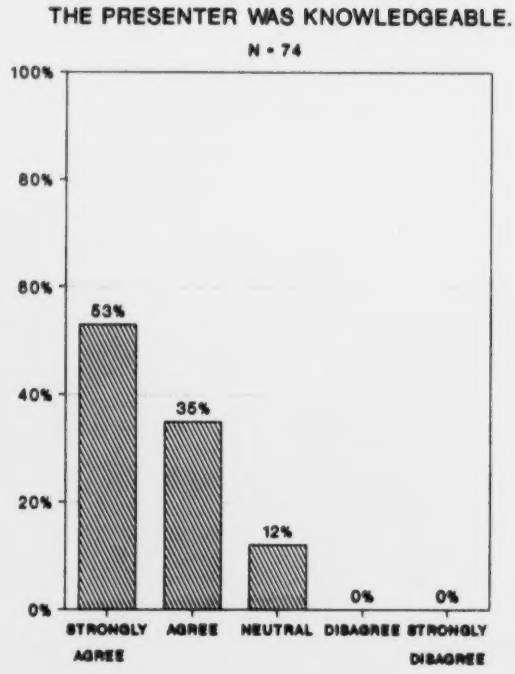
Two elementary mathematics workshops were offered by the District. The first workshop, held on January 22, concentrated on teaching an intermediate level of using the TI Explorer calculator. The second workshop, held April 22, demonstrated the use of manipulatives to assist in mathematics instruction. Both workshops were organized by the AISD elementary mathematics instructional coordinator and were sponsored in connection with Region XIII, the educational service center for Austin area schools.

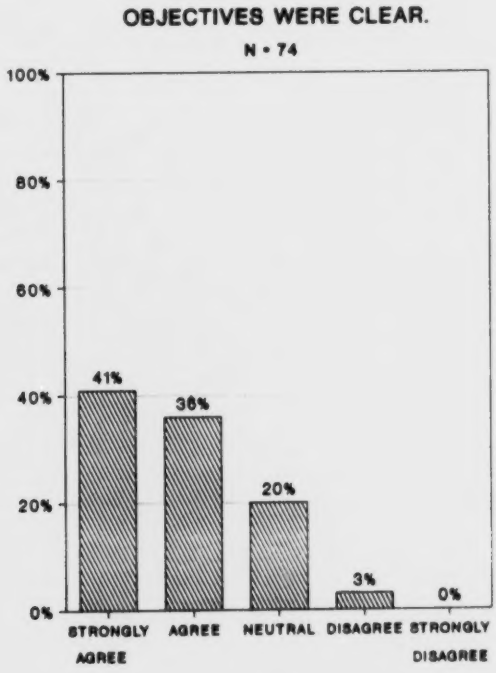
A total of 96 elementary teachers attended the two workshops and 74 completed the Region XIII evaluation questionnaire. The Region XIII evaluation questionnaire is similar to the Office of Research and Evaluation's (ORE) workshop questionnaire. The main difference between the two questionnaires is that the ORE questionnaire asks more opened-ended questions to probe for participant opinion, in addition to the Likert-style question/answers which both contain. The response rate of the Region XIII evaluation questionnaire was 77%.

Overall, the responses to the workshop evaluations were positive, especially concerning the objectives of the training session, clarity of the presentation and the knowledgeability of the presenter. Responses were also positive on issues of interest, materials effectiveness, and content relevance. See Figure 3 and also Appendix 2 for detailed information.

FIGURE 3
TITLE II ELEMENTARY MATHEMATICS
WORKSHOP EVALUATION
1991-92







91.26

Gifted Elementary Mathematics

Elementary teachers of gifted students rated the series of "Hands on Algebra" workshops highly. Many teachers expressed their enthusiasm for the materials and instructional techniques.

A series of workshops was developed to train teachers of elementary gifted students in algebra instruction, grades 3-6. The workshops were organized by the AISD gifted elementary mathematics instructional coordinator.

The "Hands on Algebra" materials and teaching techniques were introduced in the first workshop. Subsequent workshops focused on advanced instruction and class exercises. Figure 4 displays the workshop levels and dates the workshop was held.

FIGURE 4
TITLE II GIFTED ELEMENTARY MATHEMATICS WORKSHOPS
1991-92

Session	Dates
Hands on Algebra I	February 5 and 19
Hands on Algebra II	March 11 and 25
Hands on Algebra III	April 8 and 22

A total of 151 participants attended the Hands on Algebra workshops and 103 completed the ORE evaluation questionnaire (a 68% response rate). Among the respondents, one (1%) was an administrator and one (1%) was an elementary teaching assistant. All other participants were elementary teachers.

Responses to the workshop evaluations were very positive. Most of the negative comments expressed participants' desire to have more time to work with the materials. A few respondents commented on crowded facilities, and a few mentioned how difficult it was to attend a workshop after school and how tired they were.

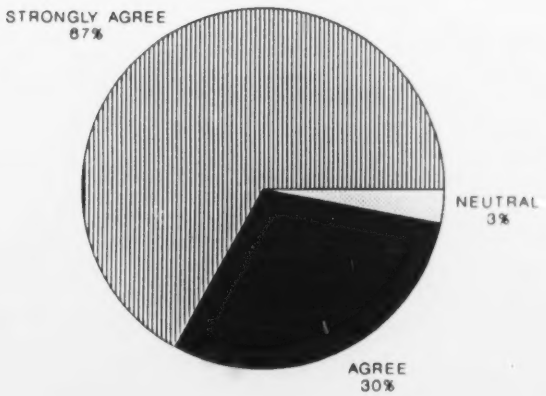
Respondents agreed or strongly agreed that the workshop was well organized, the objectives were clear, and the leader was informed and insightful (see Figure 5 and also Appendix 3).

91.26

Regarding the usefulness of the Hands on Algebra workshops, participants agreed or strongly agreed that the workshop was beneficial, receiving the training would make them better teachers, and they would like to attend additional training (see Figure 5 and also Appendix 3).

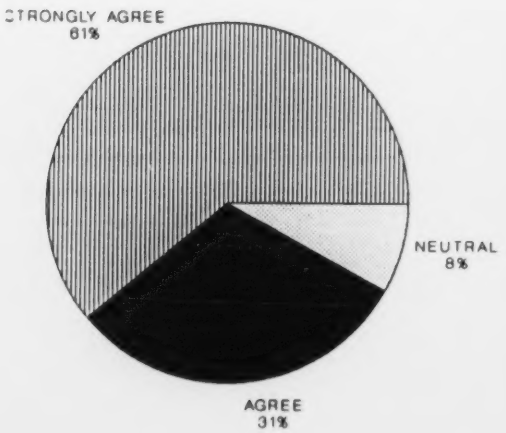
FIGURE 5
TITLE II GIFTED ELEMENTARY MATHEMATICS
"HANDS ON ALGEBRA"
WORKSHOP EVALUATION
1991-92

N = 103



RECEIVING THIS TRAINING WILL MAKE ME A BETTER TEACHER OF MATHEMATICS.

N = 103



THE WORKSHOP WAS WELL ORGANIZED

The following comments were received from participants of the various Hands on Algebra workshops.

Hands On Algebra I:

What did you like most about the training?

"I love the idea of teaching children at a young age that algebra can be great fun and not something to 'dread' as they get older. With the early training/exposure, algebra will be a snap to them!"

"The simplicity of the algebraic concept was incredible."

Any other comments?

"I feel this should not be limited to AIM High/gifted because something like this should be shared to help motivate students who need manipulatives and visuals more than students who naturally or more easily grasp such abstract concepts. The large majority of regular students should not be overlooked when it comes to motivation and this certainly motivates!"

"I attended this training on a Wednesday and used it for my observation that Friday and the following Tuesday. My evaluators could not stop raving about the content and the interest of the students. It was the best!"

Hands On Algebra II:

What did you like most about the training?

"This activity is so beneficial to children and their education."

"I can see the direct impact on the students' learning."

What did you like least about the training?

"The $300 price to get the best materials."

"That I have pre-conceived notions about algebra and it tends to get in the way of my thinking!"

Hands On Algebra III:

What did you like most about the training?

"The usefulness of materials and "hands-on" emphasis."

"The hands-on chance to use, see, and understand materials, books, etc."

91.26

Secondary Mathematics

Secondary teachers of mathematics rated the workshops positively and expressed their appreciation of the creativity and usefulness of the workshops.

The AISD secondary mathematics instructional coordinator organized a series of summer workshops designed to give teachers current information on calculator usage, instructional techniques, and classroom exercises. The Title II-funded workshops focused mostly on the teaching of algebra. Leaders of the workshops were AISD teachers considered by the secondary mathematics instructional coordinator to be highly effective, knowledgeable, and creative in teaching mathematics. All of the workshops were held at AISD schools. See Figure 6 for titles, description, and dates of workshops.

FIGURE 6
TITLE II SECONDARY MATHEMATICS WORKSHOPS
JUNE 1992

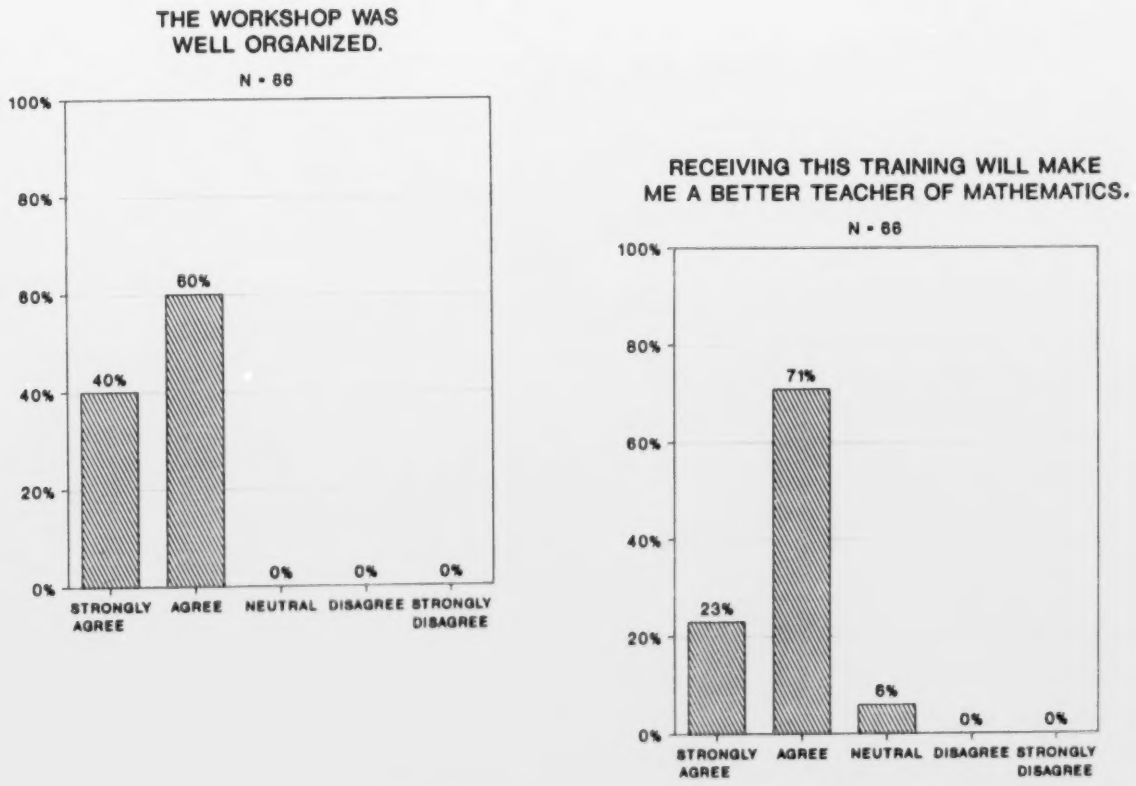
TITLE	DATE
ALGEBRA FOR EVERYONE For math teachers of grades 7-12 Ideas to accomplish AISD's goal of algebra for everyone	June 9
PREALGEBRA FOR ALL GRADE 7/8 STUDENTS For math teachers of grades 5-8 Activities promoting preparation for algebra in grades 5-8	June 10
SUPPORT ACTIVITIES FOR ALGEBRA For math teachers of grades 7-12 Activities supporting new requirement that all students take algebra to improve algebraic skills	June 8
ALGEBRA & MAINTENANCE BASIC SKILLS For math teachers of grades 6-9 Activities to maintain basic skills while developing algebraic skills	June 11

A total of 70 teachers attended the four workshops, and 66 (94%) turned in completed questionnaires. Among the respondents, 37 (53%) were middle school or junior high school teachers and 33

(47%) were high school teachers. *The participants rated all the workshops positively.* Very few negative comments were received. Most of the negative comments expressed a desire to be able to keep the graphics calculator or a desire to have more time to work with materials.

Participants agreed or strongly agreed that the workshop was well organized, the objectives were clear, and the leader was informed and insightful. Regarding the usefulness of the secondary mathematics workshops, participants agreed or strongly agreed that the workshop was beneficial, receiving the training would make them better teachers, and they would like to attend additional training (see Figure 7 and also Appendix 4).

FIGURE 7
TITLE II SECONDARY MATHEMATICS
"SUMMER WORKSHOP SERIES"
WORKSHOP EVALUATION
1991-92



The following comments were received from participants of the various workshops.

Support Activities For Algebra:

What did you like most about the training?:

"[The] hands on training on the graphing calculator plus [the] activity packet to work through and use with students."

"[I enjoyed] sharing, hands-on experience, working in groups, how the presenter was active--she walked around and helped."

Algebra For Everyone:

What did you like most about the training?:

"The wealth of information! And also the provision of handouts, books and calculators."

"The instructor and the activities for student involvement."

Prealgebra For All Grade 7/8 Students

Was this a good workshop? Why?

"Yes--It was innovative, very informative, very hands-on. Great overall."

"Yes--New & refreshing ideas were exchanged--what works, what doesn't. I especially like the manipulatives."

Algebra And Maintenance Basic Skills

Was this a good workshop? Why?

"Lots of hands-on manipulatives given. I really enjoyed meeting and talking with the middle school teachers--I learned a great deal from that."

"Hands-on experience with ideas that will be meaningful and effective."

Elementary Science

Both elementary science workshops were favorably rated. Respondents appreciated participating in an actual classroom lesson and enjoyed sharing information about "what works and what does" not with other teachers.

Two workshops, focusing on instructional techniques and use of laser discs, were held for elementary teachers. The first workshop offered was an intermediate-level workshop, a follow-up to an introductory workshop held the previous summer. The second workshop was a primary-level workshop, an introductory session for those who had not previously attended a laser disc workshop. See Figure 8 for the titles and dates of the elementary science workshops. Both workshops were organized by the elementary science instructional coordinator.

FIGURE 8
TITLE II ELEMENTARY SCIENCE WORKSHOPS
1991-92

Title	Dates
Windows on Science - Intermediate	February 25
Windows on Science - Primary	February 24

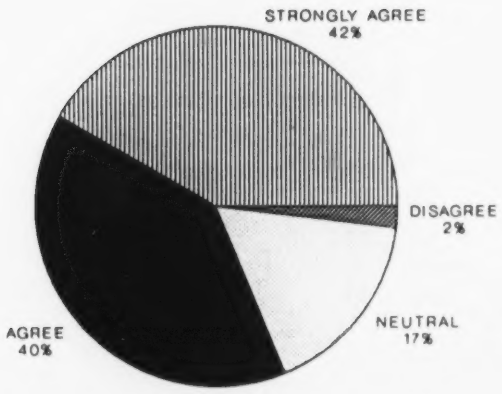
A total of 64 elementary science teachers attended the laser disc "Windows on Science" workshops, and 48 completed the ORE evaluation questionnaire (a 75% response rate).

The responses were very positive for this training. A few negative comments were written concerning the physical layout of the facility; some participants had difficulty viewing the TV screens due to glare. Several participants requested more information regarding practical classroom lessons.

Respondents agreed or strongly agreed that the workshop was well organized, the objectives were clear, and the leader was informed. Regarding the usefulness of the laser disc workshop, teachers agreed or strongly agreed that the workshop was beneficial, receiving the training would make them better teachers, and they would like to attend additional training (see Figure 9 and also Appendix 4). Unfortunately, the one teacher (2%) who disagreed that the workshop was beneficial or worthwhile did not comment on the reason he/she felt that way.

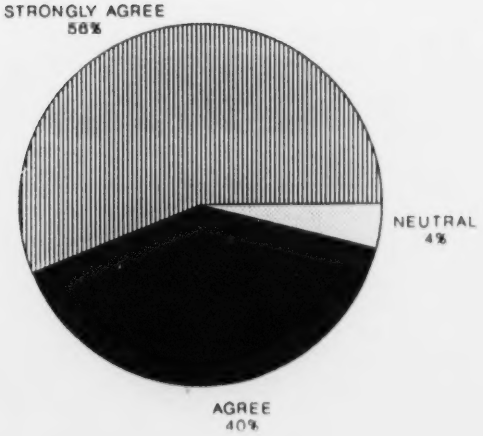
FIGURE 9
TITLE II ELEMENTARY SCIENCE
"WINDOWS ON SCIENCE"
WORKSHOP EVALUATION
1991-92

N = 48



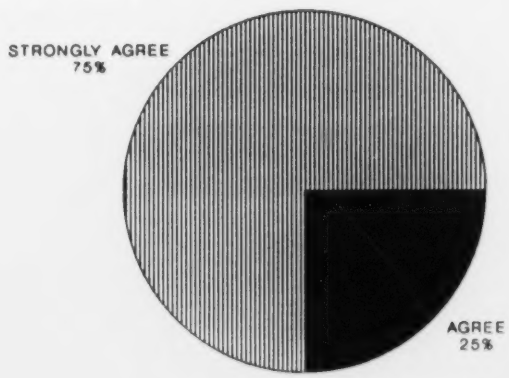
I WOULD LIKE TO ATTEND ADDITIONAL TRAINING ON THIS SUBJECT IN THE FUTURE.

N = 48



THE OBJECTIVES OF THE WORKSHOP WERE CLEAR.

N = 48



THE LEADER OF THE WORKSHOP WAS INFORMED AND INSIGHTFUL.

The following comments were received from participants in the two laser discs workshops.

Windows on Science - Intermediate:

What did you like most about the training?

"After having time to experience the new systems, we were able to come to the meeting all ready with questions and feedback."

"Well organized and we had the opportunity to share good points as well as concerns with the program."

How could this training be improved?

"More training on how to integrate the text with the laser disc."

"Possibly having the workshop in a more centrally located school would make it more accessible."

Any other comments?

"I enjoy using both programs AISD has adopted."

"I appreciate the opportunities to get further knowledge and the choice of making a substitute available rather than having to hold lengthy after school workshops."

Windows On Science - Primary:

What did you like most about the training?

"Information was lacking at my school and this was a life-saver."

"Having a classroom teacher presenting a lesson to the group."

What did you like least about the training?

"That it was done after school."

"Quite a few repetitions."

Any other comments?

"Let's keep on having these gatherings. They are very helpful and reassuring. We get to see what other teachers are doing."

"Let's have hands-on experience from different grade levels."

"I'm learning more all the time, thanks!"

91.26

Gifted Elementary Science

Participants of the introductory Design Technology workshops rated the workshops positively and appreciated the innovative program. The advanced session received mixed reviews.

Last year (1990-91), a pilot "design technology" curriculum was developed for kindergarten and first grade. The design technology program focuses on teaching engineering and science skills through hands-on experience. The initial pilot program received very high ratings.

In the fall of 1991, workshops were held to instruct more kindergarten and first grade teachers on the model, kit, and instructional techniques of the design technology program. The Design Technology Kit contains tools and materials for building structures, wheels, axles, etc. Three separate workshops were held to promote the program, and a total of 107 participants attended. Many teachers attended an introductory session and the more advanced session. Of the total participants, 42 (40%) responded to the ORE questionnaire. See Figure 10 for the titles and dates of the workshops.

FIGURE 10
TITLE II DESIGN TECHNOLOGY WORKSHOPS
1991-1992

Title	Date
Design Technology for Kindergarten	September 24, 1991
Design Technology for 1st Grade	September 25, 1991
Applications of Design Technology	October 15, 1991

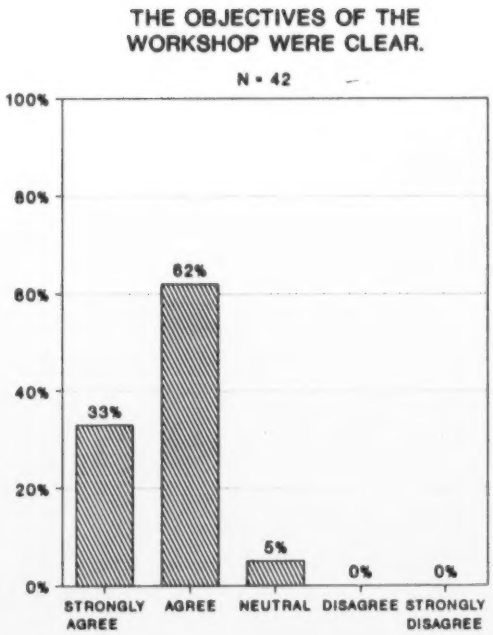
Both introductory sessions received very positive ratings from participants. Respondents appreciated the fresh and innovative program. Negative comments focused on the length and time of the after-school workshop (4:00 pm - 7:00 pm).

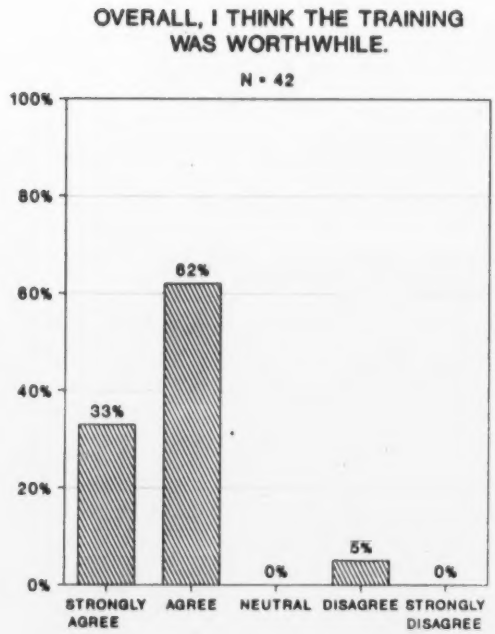
The advanced session received mixed reviews. Most of the teachers seemed to appreciate the information and rated the workshop highly. Negative comments focused on teachers' concern that they could not use the information with their students, because it was "over their heads," and several remarked that the workshop was too long for the information obtained and felt it could have been shortened considerably.

91.26

Respondents agreed or strongly agreed that the introductory workshops were well organized, the objectives were clear, and the leader was informed. Regarding the usefulness of the introductory Design Technology workshops, participants agreed or strongly agreed that the workshop was beneficial, receiving the training would make them better teachers, and they would like to attend additional training (see Figure 11 and also Appendix 6).

FIGURE 11
TITLE II GIFTED ELEMENTARY SCIENCE
"INTRODUCTION TO DESIGN TECHNOLOGY"
WORKSHOP EVALUATION
1991-92





The following comments were received from participants of the various Design Technology workshops.

Introduction to Design Technology:

What did you like most about the training?

"The presentations seems to be coherently given; the material covered was interesting and stimulating; we were encouraged to 'make things.'"

"There were actual materials made by children the previous year."

Any other comments?

"This is the direction we should be taking in education--cooperative problem solving in integrative content settings."

"I think the program and the ideas are excellent. I am in agreement with the higher level, creative thinking it provides. I am having great difficulty working it into an already overloaded curriculum."

Application to Design Technology:

What did you like most about the training?

"Hearing from teachers who had done the program last year was extremely helpful. I also enjoyed the meeting with the UT engineers. It was fun to try to 'think like an engineer.' This activity helped me explain the design program to my students and got me excited about teaching it because I was learning."

"I was able to see some things in a way I had not thought of before."

What did you like least about the training?

"The information was not useful or applicable to my class."

"The leaders were very good in their field, but the material presented was not appropriate for my grade level."

Any other comments?

"My students are really getting a lot of language (my ESL group, too) and tools necessary to think and problem solve creatively."

"The cooperative learning aspect is helping my students. So many skills used--science, math, and social. Also emotional growth is happening as they see themselves as planners and doers."

CONFERENCE EVALUATIONS

Participants responded very favorably to conference attendance. All teachers believe that conference attendance will assist in making them better teachers.

During the spring of the 1991-92 school year, 61 staff members attended mathematics or science professional conferences. Their attendance was sponsored with Title II funds (see Figure 12 for conference titles, locations, and dates). The purpose of conference participation is to expose teachers and administrators to the latest developments in mathematics/science instructional skills and knowledge. Many conference attendees share and disseminate their acquired information with colleagues.

Conference participation totalled 61 AISD staff members. This total includes 18 elementary teachers, 36 secondary teachers (12 mathematics teachers, 22 science teachers), and seven (7) administrators.

Because most conferences are held out of the Austin area, conference participants were requested to complete a questionnaire upon their return. The focus of the questionnaire is their perception of the overall significance and usefulness of the information they have obtained. *Most conference attendance was not reported to the Office of Research and Evaluation until after the close of the school year; therefore, data were not collected from many conference participants.*

Data were collected from staff members who attended the National Council of Teachers of Mathematics. A total of 15 staff members attended the conference in Nashville, Tennesee--four (4) elementary teachers, eight (8) secondary teachers, and three (3) administrators. Twelve (12) participants completed and returned the ORE Professional Conference Questionnaire (an 80% response rate). Of the 12 respondents, seven (58%) were secondary teachers, three (25%) were administrators, and two (17%) did not list their position. Data were also collected from four (4) of the six (6) staff members who attended the National Science Teachers Convention in Boston, Massachusetts (a response rate of 84%).

Participants of both mathematics and science national conferences responded very favorably to the conference structure and information gained. Most participants agreed or strongly agreed that conference attendance was beneficial and worthwhile, would make them better teachers, and they would like to attend the conference annually (see Figure 13 and also Appendix 7).

FIGURE 12
MATHEMATICS AND SCIENCE CONFERENCES
1991-92

TITLE	DATE
State Science Teachers Convention College Station, Texas	October 12-13, 1991
AP Calculus Workshop Houston, Texas	November 1-2, 1991
Creative Mathematics San Antonio, Texas	December 13, 1991
National Science Teachers Association Area Convention New Orleans, Louisiana	December 14-17, 1991
Math Solution Austin, Texas	January 14, 1992
Secondary Mathematics Conference Huntsville, Texas	January 17-18, 1992
Math and Literature Austin, Texas	March 4, 1992
National Science Teachers Association (NSTA) Boston, Massachusetts	March 27-30, 1992
National Council of Teachers of Mathematics (NCTM) Nashville, Tennesee	April 1-4, 1992

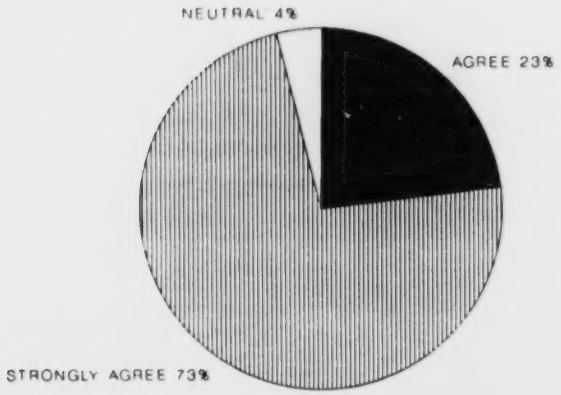
Although comments were not solicited, two participants included remarks on their questionnaires.

- One elementary administrator remarked that he/she "had already shared [information] with teachers."

- A senior high teacher noted that the "math sessions and workshops were extremely beneficial to me as a teacher. I have shared much of what I learned with my students and with my peers. I also have gained information on career development choices."

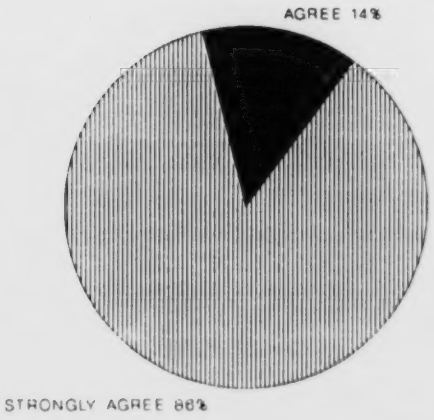
FIGURE 13
MATHEMATICS AND SCIENCE
CONFERENCE EVALUATION
1991-92

N = 18



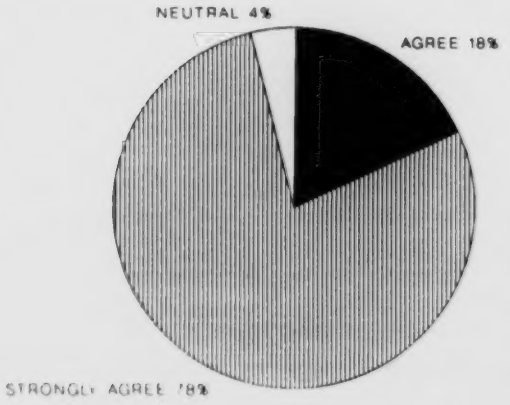
THE CONFERENCE WAS BENEFICIAL AND USEFUL.

N = 18



ATTENDING THIS CONFERENCE WILL MAKE ME A BETTER TEACHER OF MATHEMATICS AND/OR SCIENCE.

N = 18



I THINK THE CONFERENCE WAS WORTHWHILE.

CLASSROOM OBSERVATIONS

Classroom observations were performed during the spring 1992 semester to determine the degree of implementation of previously funded Title II workshops. The purpose was to ascertain if previous workshop participants used Title II-funded materials/ equipment and suggested instructional techniques. The classroom observations are part of a pilot evaluation effort designed to gather objective, observational documentation of program implementation. The observations were conducted by instructional coordinators who volunteered their time. The observations were often performed in conjunction with the coordinators' other duties. Only the mathematics instructional coordinators were able to contribute information this semester.

Elementary Mathematics

All elementary mathematics classroom observations revealed the use of Title II-funded Texas Instruments Math Explorer calculators and teaching techniques demonstrated at Title II-funded workshops.

Observations were made of four different elementary teachers. Three of the teachers taught fourth grade, and one teacher taught fifth grade. All of the classes made use of the TI Math Explorer calculators. The Math Explorer calculators were purchased with Title II funds.

The following activities, demonstrated at Title II workshops, were observed among the four elementary teachers.

- One fourth grade teacher used suggested worksheets from the Instructional Materials for the Math Explorer and made transparencies to assist in the instruction of converting decimals to fractions. The teacher used small groups, with each group having a Math Explorer calculator.

- Another fourth grade teacher made use of games learned in a calculator workshop. Using a calculator, students went through a series of activities--adding, subtracting, and multiplying numbers--which returned to the beginning number.
- The final fourth grade class observed used the calculator to divide and then compare decimals and remainders.

- The fifth grade teacher taught the placement of decimals using the calculator. The students worked in groups, and the teacher used the overhead calculator.

91.26

Gifted Elementary Mathematics

Classroom observation of four gifted elementary mathematics teachers documented the use of Title II-funded "Hands on Equations" materials and teaching techniques. A fifth teacher used an "interdisciplinary" approach taught at a Title II-funded workshop. Two teachers commented on the effectiveness of the new materials and approach.

Five teachers of gifted elementary mathematics classes were observed for about 30 minutes each. All observed teachers used Title II-funded materials and/or instruction.

The following lessons were observed and documented.

- One teacher used an interdisciplinary/projects approach to instruction where writing is included as a component of mathematics instruction.
- Using the "coaching model," one teacher related materials to previous concepts learned while using "Hands on Equations" materials.
- Another teacher used the "Hands on Equations" materials to teach the concept of negative numbers.
- Both gifted and regular students were actively engaged in algebra problems and working to solve linear equations with negative elements using "Hands on Equations" materials.
- Another teacher used the "Hands on Equations" with all students (gifted and regular students). This teacher reported that all students, regardless of ability level, were able to solve for "x" accurately. Higher ability students were able to complete the checking exercises without difficulty.

The following are positive comments which were noted on the classroom observation form pertaining to the effectiveness of the materials and instruction using "Hands on Equations."

- "The teacher has been very enthusiastic about the materials and has used the lessons for his appraisal. The principal was so impressed that he has purchased a class set to be used at the school full time."
- "Hands-On Equations is fantastic! I'm using it will <u>all</u> my kids, and no matter how low [their ability], they can all solve for 'x' accurately. Thanks for exposing me to such wonderful materials....My math instruction is improving and I am energized."

91.26

Secondary Mathematics

Two secondary mathematics teachers instructed their classes using Title II-funded workshop instructional methods. Both classes participated in using Title II-funded calculators.

Two different teachers (one teaching geometry, one teaching algebra) were observed by the secondary mathematics instructional coordinator. Both observations took place during a regular class period of 55 minutes.

Both classes used calculators purchased with Title II funds and teachers used instructional methods discussed in Title II-funded workshops. The following activities were observed.

- During a geometry session, the class participated in examining how different parameters affected a function. The class used TI-81 calculators to analyze graphs with different functions. The students appeared proficient in the use of the calculators, which suggested they had used them before.

- During an Algebra session, the teacher demonstrated an instructional model for teaching the solution of fractional, algebraic equations. Students used calculators to assist with problem solving. The students demonstrated proficient use of the calculators, suggesting they had used them before.

REFERENCES

Turner, J., (1991). Improving mathematics and science teaching: 1990-91 ESEA Title II evaluation report (ORE Pub. 90.46). Austin, TX: Austin Independent School District, Office of Research and Evaluation.

APPENDIX 1
TITLE II NEEDS ASSESSMENT
1991-92

1. I have been teaching mathematics/science ____ years (including this one):
   A. Less than 1
   B. 1-5
   C. 6-10
   D. More than 10
   E. I am not currently teaching mathematics/science.

Teachers		**A**	**B**	**C**	**D**	**E**
Elementary	N = 224	4%	23%	21%	50%	3%
Secondary	N = 84	4%	19%	14%	62%	1%
Total	N = 308	4%	22%	19%	53%	2%

2. My initial preparation for teaching mathematics/science was:
   A. Excellent
   B. Good
   C. Adequate
   D. Less than adequate
   E. Poor

Teachers		**A**	**B**	**C**	**D**	**E**
Elementary	N = 222	20%	41%	26%	10%	3%
Secondary	N = 84	45%	39%	10%	4%	2%
Total	N = 306	27%	40%	22%	8%	3%

3. I have sought additional training teaching mathematics/science beyond my initial training.
   A. Many times
   B. A few times
   C. Once or twice
   D. Never

Teachers		**A**	**B**	**C**	**D**
Elementary	N = 223	46%	35%	13%	7%
Secondary	N = 85	59%	34%	6%	1%
Total	N = 308	49%	34%	11%	6%

APPENDIX 1 (CONT.)
TITLE II NEEDS ASSESSMENT
1991-92

4. I would be interested in receiving information/training concerning:
   A. Basic mathematics and/or science skills
   B. Essential elements in mathematics and/or science
   C. AISD scopes and sequences for mathematics and/or science
   D. National standards for teaching of mathematics and/or science
   E. None of the above

Teachers		**A**	**B**	**C**	**D**	**E**
Elementary	N = 261	27%	13%	11%	26%	23%
Secondary	N = 91	10%	7%	14%	40%	29%
Total	N = 352	23%	11%	12%	30%	24%

5. I would be interested in receiving information/training concerning the use of:
   A. Computers
   B. CD ROM
   C. Laser Discs
   D. Simple Calculators
   E. Graphic Calculators
   F. None of the above

Teachers		**A**	**B**	**C**	**D**	**E**	**F**
Elementary	N = 343	45%	11%	20%	8%	9%	7%
Secondary	N = 127	42%	15%	15%	5%	17%	7%
Total	N = 470	44%	12%	19%	7%	11%	7%

6. I have received sufficient quality training to be able to teach mathematics/science well.
   A. Strongly agree
   B. Agree
   C. Neutral
   D. Disagree
   E. Strongly disagree

Teachers		**A**	**B**	**C**	**D**	**E**
Elementary	N = 226	21%	50%	23%	5%	1%
Secondary	N = 84	66%	30%	4%	0%	1%
Total	N = 310	33%	45%	17%	4%	1%

APPENDIX 1 (CONT.)
TITLE II NEEDS ASSESSMENT
1991-92

7. The training in teaching mathematics/science provided to me by the district has been:
   A. Very useful
   B. Somewhat useful
   C. Not very useful
   D. Not at all useful

Teachers		**A**	**B**	**C**	**D**
Elementary	N = 221	26%	54%	16%	4%
Secondary	N = 83	21%	46%	28%	6%
Total	N = 304	25%	52%	19%	4%

APPENDIX 2
TITLE II ELEMENTARY MATHEMATICS WORKSHOP
EVALUATION RESULTS
1991-92

N = 74	Strongly disagree				Strongly agree
	1	2	3	4	5
Objectives were clear.		3%	20%	36%	41%
Objectives were met.		3%	23%	41%	34%
Information was presented clearly and concisely.		3%	18%	38%	41%
Presenter was knowledgeable and well prepared.			12%	35%	53%
Audio-visual materials used were effective.		3%	28%	30%	39%
Printed materials were effective.		3%	24%	35%	38%
Interest was high.	3%	3%	26%	36%	32%
Content was relevant/useful.	3%	7%	19%	31%	43%

APPENDIX 3
TITLE II GIFTED ELEMENTARY MATHEMATICS WORKSHOP
EVALUATION RESULTS
1991-92

N = 103	Strongly disagree				Strongly agree
	1	2	3	4	5
The workshop was well organized.			8%	31%	61%
The objectives of the workshop were clear.			3%	44%	53%
The leader of the workshop was informed and insightful.			1%	24%	74%
The staff development workshop was beneficial and helpful.				46%	64%
Receiving this training will make me a better teacher or mathematics.			3%	30%	67%
I feel these materials will be effective in improving mathematics instruction.			2%	22%	76%
Overall, I think the training was worthwhile.				24%	76%
I would like to attend additional training on this subject in the future.		1%	5%	25%	69%

APPENDIX 4
TITLE II SECONDARY MATHEMATICS WORKSHOP
EVALUATION RESULTS
1991-92

N = 66	Strongly disagree				Strongly agree
	1	2	3	4	5
The workshop was well organized.				60%	40%
The objectives of the workshop were clear.			6%	71%	23%
The leader of the workshop was informed and insightful.			3%	34%	63%
The staff development workshop was beneficial and helpful.			3%	60%	37%
Receiving this training will make me a better teacher of mathematics.			6%	71%	23%
These materials will be effective in improving mathematics instruction.			3%	51%	46%
Overall, I think the training was worthwhile.			6%	48%	46%
I would like to attend additional training on this subject in the future.	3%		12%	43%	43%

APPENDIX 5
TITLE II ELEMENTARY SCIENCE WORKSHOPS
EVALUATION RESULTS
1991-92

N = 48	Strongly disagree				Strongly agree
	1	2	3	4	5
The workshop was well organized.				44%	56%
The objectives of the workshop were clear.			4%	40%	56%
The leader of the workshop was informed and insightful.				25%	75%
The staff development workshop was beneficial and helpful.		2%	2%	46%	50%
Receiving this training will make me a better teacher of science.			10%	54%	36%
These materials will be effective in improving science instruction.			4%	44%	52%
Overall, I think the training was worthwhile.		2%	2%	42%	52%
I would like to attend additional training on this subject in the future.		2%	17%	40%	42%

APPENDIX 6
TITLE II GIFTED ELEMENTARY SCIENCE WORKSHOPS
EVALUATION RESULTS
1991-92

N = 21	Strongly disagree				Strongly agree
	1	2	3	4	5
The workshop was well organized.		5%	10%	48%	38%
The objectives of the workshop were clear.			5%	62%	33%
The leader of the workshop was informed and insightful.		5%		43%	52%
The staff development workshop was beneficial and helpful.		5%		57%	38%
Receiving this training will make me a better teacher of science.		5%	14%	38%	43%
These materials will be effective in improving science instruction.		5%		47%	48%
Overall, I think the training was worthwhile.		5%		62%	33%
I would like to attend additional training on this subject in the future.			10%	67%	23%

APPENDIX 7
PROFESSIONAL CONFERENCES
EVALUATION RESULTS
1991-92

N = 18	Strongly disagree				Strongly agree
	1	2	3	4	5
The conference was well organized.				23%	77%
The professional conference was beneficial and helpful.			4%	23%	73%
Attending this conference will make be a better teacher of mathematics and/or science because I am now more informed of the current advancements in the field.				14%	86%
Overall, I think the conference was worthwhile.			4%	18%	78%
I would like to attend this professional conference annually.			8%	18%	74%

Austin Independent School District

Department of Management Information

Dr. Glynn Ligon, Executive Director

Office of Research and Evaluation

Dr. Evangelina Mangino, Assistant Director

Systemwide Evaluation

David Wilkinson, Evaluator

Author:

Jeannine Turner, Evaluation Associate

Board of Trustees

Dr. Beatriz de la Garza, President
Kathy Rider, Vice President
Dr. Gary McKenzie, Secretary

Diana Castañeda
Bernice Hart
Liz Hartman
Melissa Knippa
John Lay
Ted Whatley

Superintendent of Schools
Dr. Jim B. Hensley

Publication Number 91.26
July 1992